



#### SKILLSHEET 10.3

## Solving linear equations

When solving linear equations, we aim to find the value of the pronumeral that makes the equation true. (In other words, the left side should equal the right side of the equation.)

The following inverse operations enable us to solve equations:

- the inverse of addition is subtraction
- the inverse of subtraction is addition
- the inverse of multiplication is division
- the inverse of division is multiplication.

#### WORKED EXAMPLE 1

Solve the following equations to find  $x$ .

**a**  $x + 5 = 11$       **b**  $x - 8 = -5$       **c**  $3x = 17$       **d**  $\frac{x}{6} = 7$

#### THINK

- a** The inverse of adding is subtracting, so subtract 5 from both sides.
- b** The inverse of  $-8$  is  $+8$ .
- c** The inverse of  $\times 3$  is  $\div 3$ .
- d** The inverse of  $\div 6$  is  $\times 6$ .

#### WRITE

**a** 
$$\begin{aligned}x + 5 &= 11 \\x + 5 - 5 &= 11 - 5 \\x &= 6\end{aligned}$$

**b** 
$$\begin{aligned}x - 8 &= -5 \\x - 5 + 8 &= -5 + 8 \\x &= 3\end{aligned}$$

**c** 
$$\begin{aligned}3x &= 17 \\x &= \frac{17}{3} \\x &= 5\frac{2}{3}\end{aligned}$$

**d** 
$$\begin{aligned}\frac{x}{6} &= 7 \\x &= 7 \times 6 \\x &= 42\end{aligned}$$



#### WORKED EXAMPLE 2

Solve the following equations for  $x$ .

**a**  $3x + 17 = 11$

**b**  $7 - 2x = -3$

#### THINK

- a** The inverse of  $+17$  is  $-17$ .  
The inverse of  $\times 3$  is  $\div 3$ .

- b** Rewrite with the  $x$  term first.

The inverse of  $+7$  is  $-7$ .

The inverse of  $\times -2$  is  $\div -2$ .

#### WRITE

**a**  $3x + 17 = 11$

$$3x = 11 - 17$$

$$3x = -6$$

$$x = \frac{-6}{3}$$

$$x = -2$$

**b**  $7 - 2x = -3$

$$-2x + 7 = -3$$

$$-2x = -3 - 7$$

$$-2x = -10$$

$$x = \frac{-10}{-2}$$

$$x = 5$$

#### Try these

Find the value of  $x$  for the following equations.

**1**  $x + 5 = 17$

**2**  $x - 12 = 8$

**3**  $7x = 21$

**4**  $\frac{x}{9} = 5$

**5**  $x + 9 = -10$

**6**  $x - 2 = -3$

**7**  $9x = -24$

**8**  $\frac{x}{7} = -2$

**9**  $x + 3 = -4$

**10**  $x - 5 = 21$

**11**  $5x = -12$

**12**  $\frac{x}{3} = 9$

**13**  $2x + 3 = 5$

**14**  $7x - 5 = 16$

**15**  $\frac{x}{3} - 8 = 5$

**16**  $\frac{x}{5} + 4 = 9$

**17**  $5 - 2x = 7$

**18**  $8 - 7x = 16$

**19**  $3x + 7 = -12$

**20**  $7x - 7 = -12$

**21**  $2x - 3 = -5$

**22**  $11 - x = 14$

**23**  $\frac{x}{4} - 3 = -9$

**24**  $\frac{x}{6} + 9 = -7$

## SKILLSHEET — ANSWERS

### SKILLSHEET 10.3

#### Solving linear equations

- |       |                    |                    |                   |
|-------|--------------------|--------------------|-------------------|
| 1 12  | 2 20               | 3 3                | 4 45              |
| 5 -19 | 6 -1               | 7 $-2\frac{2}{3}$  | 8 -14             |
| 9 -7  | 10 26              | 11 $-2\frac{2}{5}$ | 12 27             |
| 13 1  | 14 3               | 15 39              | 16 25             |
| 17 -1 | 18 $-1\frac{1}{7}$ | 19 $-6\frac{1}{3}$ | 20 $-\frac{5}{7}$ |
| 21 -1 | 22 -3              | 23 -24             | 24 -96            |